IN THE CLAIMS

1. (Original) A method for monitoring an etch process, comprising:

(a) performing pre-etch measurements of a substrate to generate pre-etch measurement information;

(b) providing the substrate along with the pre-etch measurement information to an etch reactor;

(c) etching the substrate in the etch reactor using an etch process, wherein the pre-etch measurement information in combination with etch process monitoring are used to monitor an etch process endpoint; and

(d) terminating the etch process based on the etch process monitoring having identified that the etch process has reached the etch process endpoint.

2. (Original) The method of claim 1 further comprising applying an outlier filter to remove outliers in the pre-etch measurement information.

3. (Original) The method of claim 1 wherein the etch process monitoring of step (d) further comprises achieving a pre-determined etch depth for the etch process.

4. (Original) The method of claim 1 wherein the etch process monitoring of step (d) further comprises achieving pre-determined feature dimensions for structures formed during the etch process.

5. (Cancelled)

6. (Original) The method of claim 1 wherein the pre-etch measurement information is performed using optical metrology.

7. (Original) The method of claim 6 wherein the optical metrology comprises one or more selected from the group consisting of interferometry, scatterometry, reflectometry and ellipsometry.

8. (Original) The method of claim 1 wherein the etch process monitoring is performed using optical metrology.

9. (Original) The method of claim 8 wherein the optical metrology comprises one or more techniques selected from the group consisting of interferometry, scatterometry and reflectometry.

10. (Original) The method of claim 1 wherein the etch process monitoring further comprises:

using a correlation between a vertical etch rate and a horizontal etch rate.

11. (Original) The method of claim 1 wherein the etch process monitoring further comprises:

directing radiation onto the substrate;

collecting a portion of the radiation reflected from the substrate; and

using an interferometric measuring technique to measure a thickness of a layer.

12. (Original) The method of claim 11 wherein the radiation is directed substantially perpendicular to the substrate.

13. (Original) The method of claim 11 wherein the spectrum of the radiation directed onto the substrate comprises wavelengths in a range from about 200 to 800 nm.

14. (Original) The method of claim 11 wherein an intensity of the radiation is modulated at a frequency of about 10 Hz.

15. (Original) The method of claim 1 wherein the etch process monitoring further comprises:

directing radiation onto the substrate;

collecting a portion of the radiation reflected from the substrate; and

measuring an intensity of wavelengths in a spectrum of the radiation reflected from the substrate.

16. (Original) The method of claim 15 wherein the etch process monitoring further comprises:

using a correlation between a spectral position of a minimum in the spectrum and a width of structures formed on the substrate.

17. (Original) The method of claim 1 wherein the pre-etch measurements are provided by one of a metrology module coupled to a process system including the etch reactor and a metrology module removed from said process system.

18. (Original) A method for monitoring an endpoint of a mask trimming process, comprising:

(a) performing pre-etch measurements of a substrate having a mask thereon to generate pre-etch measurement information of such mask;

(b) providing the substrate along with the pre-etch measurement information to an etch reactor;

(c) trimming the mask using an etch process, wherein the pre-etch measurement information in combination with etch process monitoring are used to monitor a trim process; and

(d) terminating the trim process when the etch process monitoring indicates that the mask has been trimmed to pre-determined dimensions.

19. (Original) The method of claim 18 further comprising applying an outlier filter to remove outliers in the pre-etch measurement information.

20. (Original) The method of claim 18 wherein the mask is a photoresist patterned mask.

21. (Original) The method of claim 18 wherein the mask is trimmed using a plasma process.

22. (Cancelled)

23. (Original) The method of claim 18 wherein the pre-etch measurement information is performed using optical metrology.

24. (Original) The method of claim 23 wherein the optical metrology comprises one or more techniques selected from the group consisting of interferometry, scatterometry, reflectometry and ellipsometry.

25. (Original) The method of claim 18 wherein the etch process monitoring is performed using optical metrology.

26. (Original) The method of claim 25 wherein the optical metrology comprises one or more techniques selected from the group consisting of interferometry, scatterometry and reflectometry.

27. (Original) The method of claim 18 wherein the etch process monitoring further comprises:

using a correlation between a vertical etch rate and a horizontal etch rate.

28. (Original) The method of claim 18 wherein the etch process monitoring further comprises:

directing radiation onto the substrate;

collecting a portion of the radiation reflected from the substrate; and

using an interferometric measuring technique to measure a thickness of a layer.

29. (Original) The method of claim 28 wherein the radiation is directed substantially perpendicular to the substrate.

30. (Original) The method of claim 28 wherein a spectrum of the radiation directed onto the substrate comprises wavelengths in a range from about 200 to 800 nm.

31. (Original) The method of claim 28 wherein an intensity of the radiation is modulated at a frequency of about 10 Hz.

32. (Original) The method of claim 18 wherein the etch process monitoring further comprises:

directing radiation onto the substrate;

collecting a portion of the radiation reflected from the substrate; and

measuring an intensity of wavelengths in a spectrum of the radiation reflected from the substrate.

33. (Original) The method of claim 32 wherein the etch process monitoring further comprises:

using a correlation between a spectral position of a minimum in the spectrum and a width of the structures formed on the substrate.

34. (Cancelled)

35. (Original) A system for monitoring an etch process, comprising:

at least one reactor to perform an etch process;

at least one metrology module to provide pre-etch measurement information to the at least one etch reactor; and

at least one substrate robot,

wherein the at least one reactor comprises an etch process measuring module for monitoring an etch process endpoint in the etch reactor.

36. (Original) The system of claim 35 wherein the at least one etch reactor is a plasma reactor.

37. (Original) The system of claim 35 wherein the at least one metrology module uses a non-destructive optical measuring technique.

38. (Original) The system of claim 35 wherein the etch process measuring tool uses an interferometric measuring technique.

39. (Original) The system of claim 35 wherein the etch process measuring tool further comprises:

a source of a radiation to illuminate a region on the substrate; and

an interferometer.

40. (Original) The system of claim 35 wherein the source of radiation provides radiation substantially perpendicular to the substrate.

41. (Original) The system of claim 35 wherein the source of radiation provides radiation at wavelengths in a range from about 200 to 800 nm.

42. (Original) The system of claim 39 wherein the source of radiation modulates an intensity of the radiation at a frequency of about 10 Hz.

43. (Original) An in-situ metrology tool, comprising:

at least one plasma reactor to perform wafer processing;

at least one measurement module, coupled to the at least plasma reactor, for measuring at least one of a thickness of a layer on a substrate and a critical dimension; and

at least one plasma state monitoring module, coupled to the at least one plasma reactor, for monitoring a plasma state within the at least one plasma reactor.

44. (Original) The tool of claim 43 wherein the thickness measurement module uses an interferometric measuring technique.

45. (Original) The tool of claim 43 wherein the critical dimension measurement module uses a non-destructive optical measuring technique.

46. (Original) The tool of claim 43 wherein the plasma state monitoring module usages an optical electromagnetic emission measuring technique.

47. (Original) The tool of claim 43 wherein the plasma reactor is a plasma etch reactor.

48. (Original) A method of processing data collected by an in-situ metrology tool of a semiconductor wafer processing system, comprising:

examining data representing signal intensity versus time as collected by the in-situ metrology tool; and

selecting, based on the data, a time window for performing a Discrete Fourier Transformation upon at least one portion of the data.

49. (Original) The method of claim 48, further comprising:

if the data representing signal intensity versus time indicate decreasing peak to peak periods, reduce the time window; and

if the data representing signal intensity versus time data indicate increasing peak to peak periods, increase the time window.